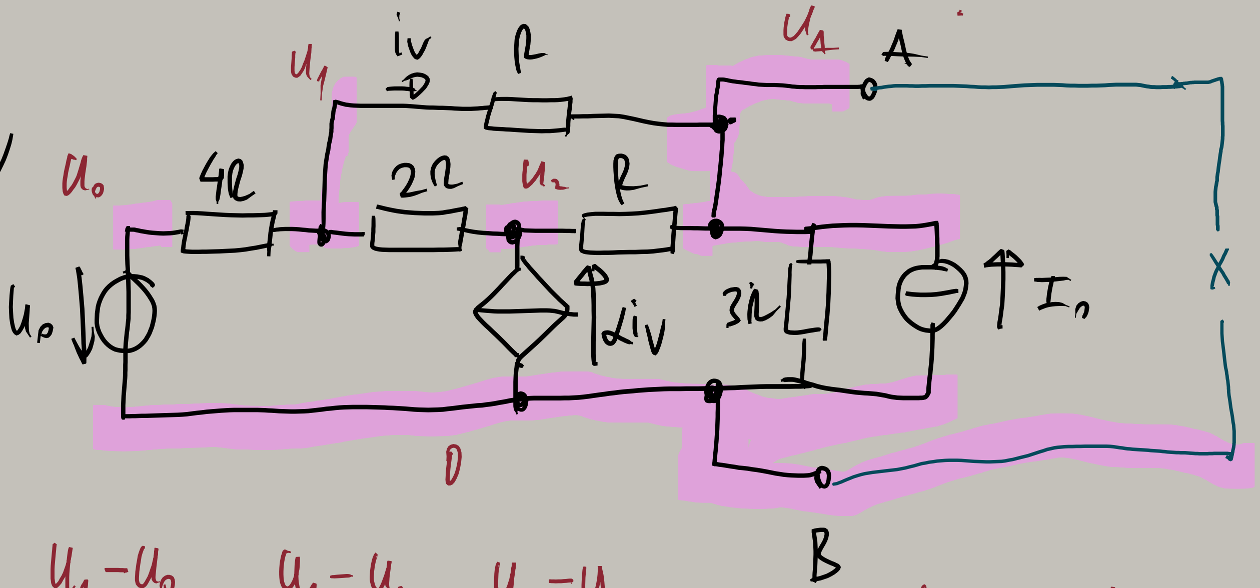
9)



U_1, U_2, U_A, I_V

1) $$\frac{U_1 - U_0}{4R} + \frac{U_1 - U_A}{R} + \frac{U_1 - U_2}{2R} = 0$$

2) $$-\alpha I_V + \frac{U_2 - U_1}{2R} + \frac{U_2 - U_A}{R} = 0$$

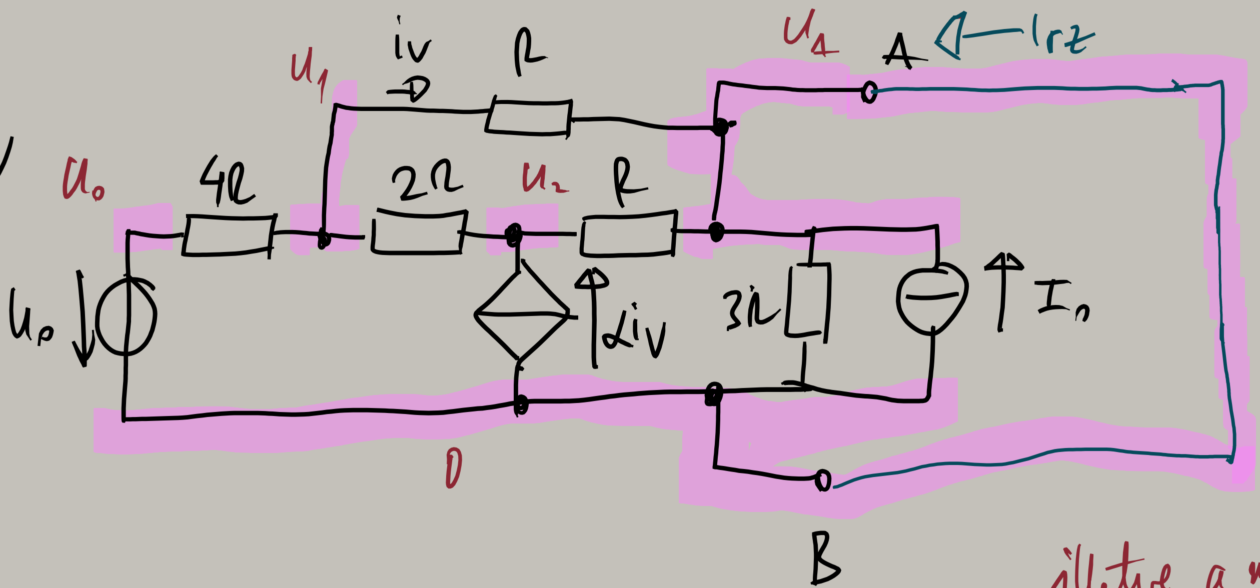
3) $$\frac{U_A - U_1}{R} + \frac{U_A - U_2}{R} + \frac{U_A}{3R} + (-I_0) = 0$$

4) $$I_V = \frac{1}{R}(U_1 - U_A)$$

$$\begin{pmatrix} \frac{1}{R} + \frac{1}{2R} + \frac{1}{4R} & -\frac{1}{2R} & -\frac{1}{R} & 0 \\ -\frac{1}{2R} & \frac{1}{R} + \frac{1}{2R} & -\frac{1}{R} & -\alpha \\ -\frac{1}{R} & -\frac{1}{R} & \frac{1}{R} + \frac{1}{R} + \frac{1}{3R} & 0 \\ -\frac{1}{R} & 0 & \frac{1}{R} & 1 \end{pmatrix} \begin{pmatrix} U_1 \\ U_2 \\ U_A \\ I_V \end{pmatrix} = \begin{pmatrix} \frac{U_0}{4R} \\ 0 \\ I_0 \\ 0 \end{pmatrix}$$

rövidzár terhelés esetén

9,



$\boxed{U_4 = 0} \rightarrow 3)$

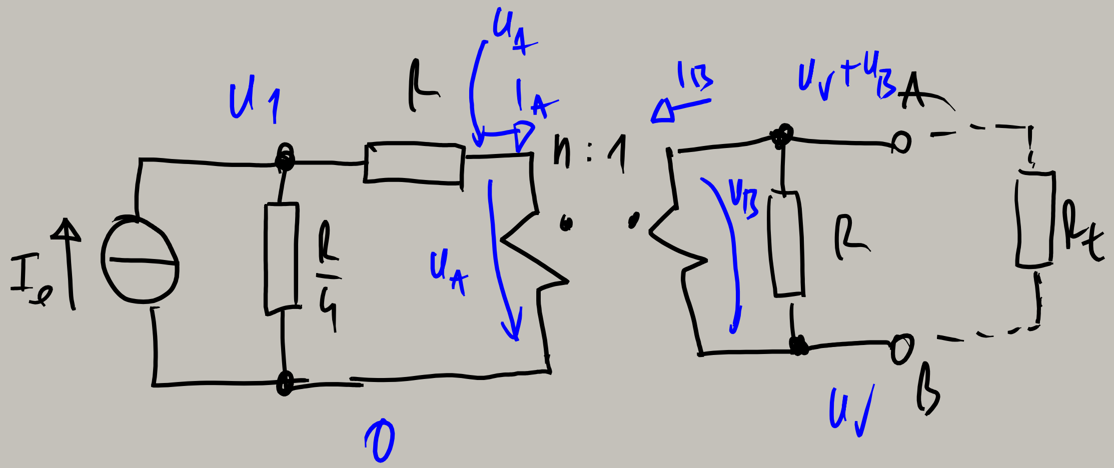
$$-i_{rz} + \frac{U_4 - U_1}{R} + \frac{U_4 - U_2}{R} + \frac{U_4}{3\Omega} - I_0 = 0$$

illetve a megoldás után

$$i_{rz} = -I_0 + \frac{-U_1}{R} + \frac{-U_2}{R}$$

$$\begin{pmatrix} \frac{1}{R} + \frac{1}{2\Omega} + \frac{1}{4\Omega} & -\frac{1}{2\Omega} & -\frac{1}{R} & 0 \\ -\frac{1}{2\Omega} & \frac{1}{R} + \frac{1}{2\Omega} & -\frac{1}{R} & -\alpha \\ 0 & 0 & 1 & 0 \\ -\frac{1}{R} & 0 & \frac{1}{R} & 1 \end{pmatrix} \begin{pmatrix} U_1 \\ U_2 \\ U_4 \\ i_V \end{pmatrix} = \begin{pmatrix} \frac{U_0}{4\Omega} \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

7.)



Írjuk fel az R_t tetszőleges értékére!

emlékezünk!

U_v-t nem fogjuk tudni meghatározni!

ismeretlenek: U_1, U_A, U_B, I_A, I_B

1) $-I_0 + \dfrac{U_1}{R/4} + \dfrac{U_1 - U_A}{R} = 0$

2) $I_A + \dfrac{U_A - U_1}{R} = 0$

3) $I_B + U_B/R + U_B/R_t = 0$

4) $U_A = n \cdot U_B$

5) $I_B = -n \cdot I_A$

$$
\begin{array}{ccccc}
\underbrace{U_1} & \underbrace{U_A} & \underbrace{U_B} & \underbrace{I_A} & \underbrace{I_B}
\end{array}
$$

$$
\begin{pmatrix}
\frac{4}{R}+\frac{1}{R} & -\frac{1}{R} & \cdot & \cdot & \cdot \\
-\frac{1}{R} & \frac{1}{R} & \cdot & 1 & \cdot \\
\cdot & \cdot & \frac{1}{R}+\frac{1}{R_t} & \cdot & 1 \\
\cdot & 1 & -n & \cdot & \cdot \\
\cdot & \cdot & \cdot & n & 1
\end{pmatrix}
\begin{pmatrix} U_1 \\ U_A \\ U_B \\ I_A \\ I_B \end{pmatrix}
=
\begin{pmatrix} I_0 \\ \cdot \\ \cdot \\ \cdot \\ \cdot \end{pmatrix}
$$

megj. a ·-ok helyén 0 van (csak így jobban látszik!)

Leírás szakadással: $R_t \to \infty$, azaz $1/R_t \to 0$

$$\begin{pmatrix} \frac{1}{R}+\frac{1}{R} & -\frac{1}{R} & \cdot & \cdot & \cdot \\ -\frac{1}{R} & \frac{1}{R} & \cdot & 1 & \cdot \\ \cdot & \cdot & \frac{1}{R} & \cdot & 1 \\ \cdot & 1 & -n & \cdot & \cdot \\ \cdot & \cdot & \cdot & n & 1 \end{pmatrix} \begin{pmatrix} U_1 \\ U_A \\ U_B \\ I_A \\ I_B \end{pmatrix} = \begin{pmatrix} I_0 \\ \cdot \\ \cdot \\ \cdot \\ \cdot \end{pmatrix}$$

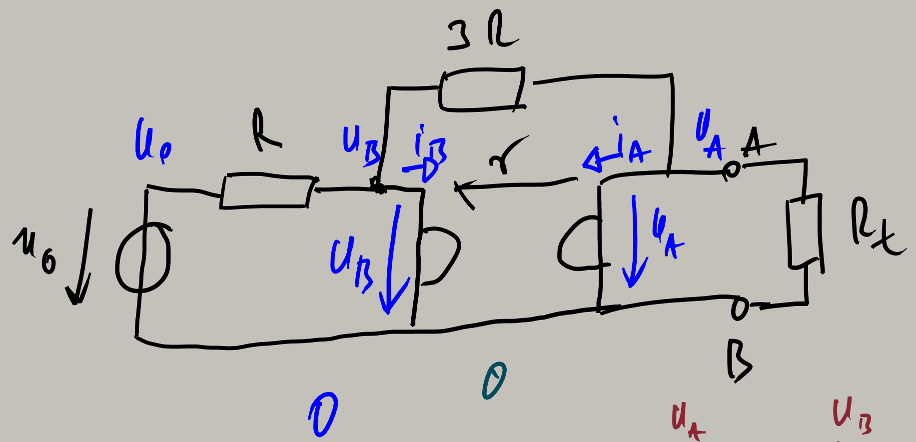
és $U_{\text{ü}} = U_B = U_1$

Leírás rövidzárral ($R_t = 0$, $1/R_t \to \infty$) azaz $U_B = 0$

$$\begin{pmatrix} \frac{1}{R}+\frac{1}{R} & -\frac{1}{R} & \cdot & \cdot & \cdot \\ -\frac{1}{R} & \frac{1}{R} & \cdot & 1 & \cdot \\ \cdot & \cdot & 1 & \cdot & \cdot \\ \cdot & 1 & -n & \cdot & \cdot \\ \cdot & \cdot & \cdot & n & 1 \end{pmatrix} \begin{pmatrix} U_1 \\ U_A \\ U_B \\ I_A \\ I_B \end{pmatrix} = \begin{pmatrix} I_0 \\ \cdot \\ \cdot \\ \cdot \\ \cdot \end{pmatrix}$$

és $I_{rz} = I_B$ módon a rövidzárási áram számítható

3)



ismételten tetszőleges R_t-re felírva!

- figyeljünk a gyrátor primer és szekunder oldalán (merre mutat a nyíl!)

1) $\dfrac{u_A}{R_t} + i_A + \dfrac{u_A - u_B}{3R} = 0$

2) $i_B + \dfrac{u_B - u_A}{3R} + \dfrac{u_B - u_0}{R} = 0$

3) $u_A = -r \cdot i_B$

4) $u_B = r \cdot i_A$

$$
\begin{array}{cccc}
u_A & u_B & i_A & i_B
\end{array}
$$

$$
\begin{pmatrix}
\frac{1}{3R}+\frac{1}{R_t} & -\frac{1}{3R} & 1 & \cdot \\
-\frac{1}{3R} & \frac{1}{R}+\frac{1}{3R} & \cdot & 1 \\
1 & \cdot & \cdot & r \\
\cdot & 1 & -r & \cdot
\end{pmatrix}
\begin{pmatrix} u_A \\ u_B \\ i_A \\ i_B \end{pmatrix}
=
\begin{pmatrix} \cdot \\ u_0/R \\ \cdot \\ \cdot \end{pmatrix}
$$

$\cdot = 0$ most is (jobban látható a nem-zérus elem)

keresett válasz u_A ($u_t = u_A$)

Szakadással lezárt $\left(R_t \to \infty,\ 1/R_t \to 0\right)$

$$\begin{array}{cccc} U_A & U_B & I_A & I_B \end{array}$$

$$\begin{pmatrix} \frac{1}{3R} & -\frac{1}{3R} & 1 & \cdot \\ -\frac{1}{3R} & \frac{1}{R}+\frac{1}{3R} & \cdot & 1 \\ 1 & \cdot & \cdot & r \\ \cdot & 1 & -r & \cdot \end{pmatrix} \begin{pmatrix} U_A \\ U_B \\ I_A \\ I_B \end{pmatrix} = \begin{pmatrix} \cdot \\ U_0/R \\ \cdot \\ \cdot \end{pmatrix} \quad \to \quad U_{sz} = U_T = U_A$$

<u>Rövidzár</u> $\to U_A = 0$

$$\begin{array}{cccc} U_A & U_B & I_A & I_B \end{array}$$

$$\begin{pmatrix} 1 & \cdot & \cdot & \cdot \\ -\frac{1}{3R} & \frac{1}{R}+\frac{1}{3R} & \cdot & 1 \\ 1 & \cdot & \cdot & r \\ \cdot & 1 & -r & \cdot \end{pmatrix} \begin{pmatrix} U_A \\ U_B \\ I_A \\ I_B \end{pmatrix} = \begin{pmatrix} \cdot \\ U_0/R \\ \cdot \\ \cdot \end{pmatrix}$$

és $I_{rz} = I_A + \frac{0 - U_B}{3R}$